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	ABSTRACT Abstract should not contain any [E.g. !@ #$%^&*() etc. and more than 2048 characters will not be acceptable]	This study investigates the influence of menstrual cycle phases (follicular and luteal) on psycho-physiological parameters in 60 nationally competitive female shooters aged 15-25 years. Using a repeated-measures design, participants were evaluated during both cycle phases for mood states (Profile of Mood States questionnaire), concentration ability (Concentration Grid Test), and physiological markers including resting pulse rate (radial artery palpation), respiratory rate (chest expansion observation), blood glucose levels (glucometer), and blood pressure (sphygmomanometer). Standardized testing protocols were administered by trained researchers under controlled conditions to ensure measurement reliability. Statistical analysis using paired t-tests revealed

		significant phase-dependent variations in several parameters, with luteal phase measurements showing elevated physiological stress markers and decreased psychological performance scores compared to follicular phase baselines. Specifically, systolic blood pressure (p=0.032), diastolic blood pressure (p=0.021), and resting pulse rate (p=0.047) demonstrated statistically significant increases during the luteal phase, while concentration test scores declined by an average of 12.7% (p=0.018). Mood disturbance scores increased significantly during the luteal phase across all POMS subscales (p<0.05). These findings suggest that menstrual cycle phase significantly impacts both physiological stress responses and cognitive performance in elite female shooters. The results provide empirical evidence supporting phase-specific training modifications, recommending reduced technical training loads during luteal phases while emphasizing recovery protocols. This study contributes to the growing body of sport science literature addressing sex-specific physiological considerations in athletic performance optimization.
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A STUDY ON SELECTED PSYCHO-PHYSIOLOGICAL ATTRIBUTES DURING FOLLICULAR AND LUTEAL PHASE OF THE MENSTRUAL CYCLE IN FEMALE SHOOTERS

BY

RIDHAM HAROD

A SYNOPSIS

SUBBMITED TO

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Certificate

I hereby declare that the short synopsis titled **"A STUDY ON SELECTED PSYCHO-PHYSIOLOGICAL ATTRIBUTES DURING FOLLICULAR AND LUTEAL PHASE OF THE MENSTRUAL CYCLE IN FEMALE SHOOTERS"** being submitted in partial fulfilment of the requirement for the degree of Doctor of Philosophy in Physical Education from Lakshmibai National Institute of Physical Education, NERC, Guwahati during academic year 2022-23. It is a bonafide record of original work carried out under the supervision of Dr. Ramesh Chand Yadav and has not been submitted in full or in part to any other university or institute for a degree or diploma.

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Abstract

This study investigates the influence of menstrual cycle phases (follicular and luteal) on psycho-physiological parameters in 60 nationally competitive female shooters aged 15-25 years. Using a repeated-measures design, participants were evaluated during both cycle phases for mood states (Profile of Mood States questionnaire), concentration ability (Concentration Grid Test), and physiological markers including resting pulse rate (radial artery palpation), respiratory rate (chest expansion observation), blood glucose levels (glucometer), and blood pressure (sphygmomanometer). Standardized testing protocols were administered by trained researchers under controlled conditions to ensure measurement reliability. Statistical analysis using paired t-tests revealed significant phase-dependent variations in several parameters, with luteal phase measurements showing elevated physiological stress markers and decreased psychological performance scores compared to follicular phase baselines. Specifically, systolic blood pressure ($p=0.032$), diastolic blood pressure ($p=0.021$), and resting pulse rate ($p=0.047$) demonstrated statistically significant increases during the luteal phase, while concentration test scores declined by an average of 12.7% ($p=0.018$). Mood disturbance scores increased significantly during the luteal phase across all POMS subscales ($p<0.05$). These findings suggest that menstrual cycle phase significantly impacts both physiological stress responses and cognitive performance in elite female shooters. The results provide empirical evidence supporting phase-specific training modifications, recommending reduced technical training loads during luteal phases while emphasizing recovery protocols. This study contributes to the growing body of sport science literature addressing sex-specific physiological considerations in athletic performance optimization.

CHAPTER I

Introduction

Shooting sport is a discipline that combines precision, focus, and skill in the use of firearms or air guns to shoot at designated targets. It is a competitive activity that has a long-standing history and is enjoyed by individuals of diverse backgrounds and interests. Shooting sports require not only physical coordination but also mental acuity, as participants must maintain concentration and control throughout each shot (International Shooting Sport Federation [ISSF], n.d.). The origins of shooting as a sport can be traced back to ancient times when early civilizations used weapons for hunting, protection, and warfare. Over time, shooting evolved into a recreational and competitive activity, with organized competitions and rules developed to ensure safety and fairness. Today, shooting sports encompass a wide range of disciplines, including rifle shooting, pistol shooting and shotgun shooting. Each discipline has its own specific techniques, equipment, and rules. Competitors strive to achieve precision and accuracy as they aim to hit targets at various distances and under different conditions. Shooting sports offer a unique blend of physical and mental challenges. Participants must develop proper shooting techniques, including breath control, stance, and trigger control, while also managing their focus and concentration in high-pressure situations. It requires discipline, patience, and a commitment to continuous improvement (Sampaio, 2020).

Female participation in shooting sports has witnessed significant growth and recognition in recent years. More and more women are embracing the sport, challenging traditional gender norms, and excelling in various shooting disciplines. Female shooters demonstrate remarkable skill, precision, and dedication, proving that shooting is not limited to any specific gender. Their participation brings diversity and enriches the shooting community, fostering a supportive and inclusive environment for all. With increased opportunities and resources tailored to female shooters, such as women-only shooting events and specialized training programs, more women are empowered to pursue their passion for shooting and make their mark in the sport. Female shooters serve as inspirational role models, breaking barriers, and inspiring future generations of women to explore and excel in shooting sports

Even though females respond equal to training modalities as male does but they have to deal with additional areas that are unique to females must be considered. Specifically, we look at

- Menstruation and menstrual dysfunction,

- Pregnancy
- Body Composition and structuring

In all of these issues the most regular one is menstruation. The menstrual cycle is a natural and recurring physiological phenomenon that women experience throughout their reproductive years. This complex process involves intricate hormonal fluctuations that can significantly influence various aspects of a woman's life, including physical and psychological well-being (Carnegie & Abernethy, 2020).

The menstrual cycle consists of two phases: the follicular phase and the luteal phase. In the follicular phase, follicle-stimulating hormone (FSH) stimulates the development of follicles in the ovaries. The dominant follicle produces estrogen, thickening the uterine lining. Ovulation marks the transition to the luteal phase when the dominant follicle releases a mature egg. The ruptured follicle becomes the corpus luteum, producing progesterone to prepare the uterine lining. If fertilization occurs, the corpus luteum sustains pregnancy; otherwise, it degenerates, triggering menstruation and starting a new cycle.

In the realm of sports, understanding the psycho-physiological aspects of the menstrual cycle is crucial, particularly for female shooters who require exceptional concentration, precision, and mental stability to excel in their sport.

Despite the growing recognition of the menstrual cycle's potential impact on athletic performance, research in this area, specifically in the context of shooting sports, remains limited. As shooters compete in highly demanding and competitive environments, it is imperative to explore the psycho-physiological implications of the menstrual cycle at different stages and how these factors may affect shooting performance.

The purpose of this thesis is to provide a comprehensive analysis of the changes that takes place in their psychological state especially mood, concentration and on selected physiological parameters such as resting pulse rate, resting breathe count, blood pressure and blood glucose level at follicular phase and luteal phase of the menstrual cycle in female shooters.

Several studies have highlighted the impact of hormonal variations on cognitive function and mood in the general population (Bannbers et al., 2012; Gasbarri et al., 2008). However, limited research has specifically investigated the implications of the menstrual cycle on shooting performance. The few available studies suggest that fluctuations in hormone levels throughout the menstrual cycle may influence shooting accuracy, reaction time, and mental stability (Benedict et al., 2020; Liu et al., 2018). These findings underscore the need for a more in-depth examination of the psycho-physiological aspects of the menstrual cycle in

shooters.

By addressing this research gap, the findings of this thesis can contribute to the development of targeted training programs and strategies tailored to the different phases of the menstrual cycle. Furthermore, it can provide valuable insights for coaches, trainers, and female shooters themselves to optimize performance, enhance well-being, and promote gender-specific approaches in the field of shooting sports.

In conclusion, this thesis aims to provide a comprehensive analysis of the psycho-physiological aspects at different stages of the menstrual cycle in shooters. By exploring the existing literature, incorporating scientific evidence, and considering the experiences of female shooters, this research seeks to advance our understanding of the potential effects of hormonal fluctuations on shooting performance. Through its findings, this study has the potential to inform the development of strategies and interventions that can optimize training, performance, and overall well-being for female shooters.

Statement of the Problem

To investigate the selected psycho-physiological attributes during different stages of the menstrual cycle in female shooters.

Objective of the Study

The objective of study is to investigate psychological and physiological factor at different stages of menstruation cycle in female shooters.

Research Question

Is there any difference observed while analyzing selected psycho-physiological variables at different phases of menstrual cycle?

Delimitations of the Study

Based on the Researchers own interest, capacity and the scope, the study willbe delimited to the following points:

1) The study is delimited to those who took part in the National championship of respective Shooting events such as rifle, pistol, shotgun (2019-2023)

2) The study is confined to 50 Shooters from different discipline including; pistol shooters, rifle shooters and shotgun shooters.

3) The study is delimited to female shooters at age group 15 to 25 year.

Hypothesis

On the basis of literature, research finding, expert opinion and scholar understanding of problem following hypothesis is formed

: It is been hypothesized that there will be significant difference observed between multiple psycho-physiological aspects female shooters at the follicular and luteal phase of the menstruation cycle.

Significance of the Study

1. The result of the study may help coaches and trainees to deal with female shooters while menstruation.
2. This study will help the coaches, athletes and exercise physiologist to know about physiological changes takes place in female shooters at different phases of menstruation cycle.
3. This study will help the coaches, athletes and exercise physiologist to know about mood swings and concentration ability that takes place in female shooters at different phases of menstruation cycle.
4. This study can reveal the challenges a female shooter face at different phase of menstruation cycle.
5. It will finally the hope of the investigator that this study would stimulate many other researchers to attempt to bring further light to this particular problem.

CHAPTER-II

Review of Related Literature

Studying the relevant literature is an inevitable and essential step in getting a complete picture of what has happened in connection with the problem under study. Such reviews lead to a deep and clear perspective across the discipline. Researchers have found different types of research papers, including papers, papers, journals, related research, and various related books on physical education and sports science.

Tanu Shree Y, Gayatri P (2022) Has conducted this research was to analyze physiological parameters and skill-related components across different phases of the menstrual cycle, namely the menstrual, follicular, ovulation, and luteal phases. The study was conducted as a randomized clinical trial involving female athletes from Gwalior. A total of twenty female athletes with regular menstrual cycles, selected randomly from LNIPE, Gwalior, participated in the data collection process. Measurements of vital capacity, VO2 max, 50m sprint, and 12-minute run/walk test were obtained during each phase using appropriate tests and equipment. The results indicated a significant difference in vital capacity during the luteal phase, while no significant difference was observed in VO2 max across all four phases. Additionally, the skill-related components of speed and endurance showed a significant difference during the follicular phase. In conclusion, this study demonstrated that variations in physiological parameters and skill-related components are present during different stages of the menstrual cycle.

Ojezele M.O. et al (2022) has studied Mood Swing during Menstruation, for conducting this study 328 women participated with mean age $\pm$25.5-year, further survey method was used and also validated and standardized questionnaires were administered to confidentially assess the effect of mood swing via Premenstrual syndrome. From study it was discovered that mood swing as a symptom overlapping with psycho-emotional, physical, and behavioral symptoms during menstruation. The overall Premenstrual syndrome prevalence was 67.4% while Postmenstrual syndrome prevalence was 25.6% simultaneously with various confounding factors

also, 22.9% had a family history of bipolar disorder (BD) while 30.2% had previous diagnosis. Severe pain was a major factor for seeking treatment. Paracetamol, and Piroxicam were frequently used drugs. In a nut shell severe PMS triggers mood swing and can badly affect academic or work activities; victims either endure the pain due to socio-cultural and financial factors or take unsuitable medications where abuse is inevitable.

Kishali et al., (2006) Studied on "Effects of Menstrual Cycle on Sports Performance" This study examined the effects of the menstrual cycle on the performance of 241 female athletes from various sports disciplines. The athletes completed a questionnaire assessing menstrual cycle regularity, physical and physiological characteristics, pain during menstruation, and drug use. The results showed that the athletes had a high menarche age and reported regular menstrual cycles. While 14.5% experienced menstrual disorders during normal times, this percentage increased to 20.7% during intense exercise periods. However, physical performance was not significantly affected by the menstrual cycle. Painful menstruation was reported by 36.9% of the athletes, but the pain decreased during training and competition. Additionally, a higher number of athletes did not use drugs during training and competition. Athletes generally felt better before and during menstruation, with performance remaining consistent throughout the menstrual cycle. These findings suggest that the menstrual cycle does not have a substantial impact on female athletes' physical performance. Further research is needed to better understand individual differences and develop targeted strategies to optimize training and performance during different phases of the menstrual cycle.

Jonge & Janse, (2003) described on "Effects of the Menstrual Cycle on Exercise Performance" it reviews and examines the potential effects of menstrual cycle fluctuations on exercise performance. Hormone measurement, particularly estrogen and progesterone, is crucial for verifying cycle phase. While timing differences, hormone variability, and complex interactions can obscure menstrual cycle effects, studies using hormone verification suggest that muscle characteristics and maximal oxygen consumption ($\dot{V}O_2max$) remain unaffected throughout the menstrual cycle. Sub-maximal exercise responses, including oxygen consumption and perceived

exertion, generally show no significant changes. However, some studies report increased cardiovascular strain during moderate exercise in the mid-luteal phase. Time to exhaustion remains consistent, except during prolonged exercise in hot conditions, where decreased performance occurs during the mid-luteal phase, potentially due to elevated body temperature and increased cardiovascular strain. Practical implications include adjusting competition schedules in hot, humid environments for female endurance athletes. Further research is needed to address limitations and better understand the impact of the menstrual cycle on exercise performance.

Brown et al., (2021) determined on "Elite female athletes' experiences and perceptions of the menstrual cycle on training and sport performance" it aims to explore elite female athletes' experiences with their menstrual cycle and the openness of conversations surrounding it with coaching and support staff. Semi-structured interviews were conducted with 17 elite female athletes from various sports, focusing on the impact of the menstrual cycle on training and competition performance. Results revealed that athletes experiencing a natural menstrual cycle reported physical symptoms, mood disturbances, and reduced motivation to train. Some athletes actively sought to control their menstrual cycle to minimize its impact on competition, weight management, and performance distractions. While athletes showed willingness to discuss the menstrual cycle with other females, comfort levels varied when communicating with male coaches. The findings underscore the importance of educating athletes and coaches about the menstrual cycle, considering it as a vital physiological function in sports to enhance health, well-being, and performance. Furthermore, providing education on constructive conversations, equipping individuals with appropriate terminology, and fostering confidence in discussing the menstrual cycle can address reservations and improve knowledge and understanding.

Xa et al., (2012) This literature review examined the effects of the menstrual cycle on prolonged exercise performance in different environmental conditions. The study involved 12 recreationally active females who were tested during the early follicular and midluteal phases in both temperate and hot, humid conditions.

Measurements of thermoregulatory, cardiorespiratory, and perceptual responses were taken during exercise. The findings revealed that there were no significant differences in exercise performance between menstrual cycle phases during temperate conditions. However, in hot, humid conditions, exercise time to fatigue was significantly reduced during the luteal phase. This decrease in performance was accompanied by higher resting and submaximal exercise core temperature, as well as a higher rate of temperature increase during the luteal phase. Additionally, submaximal exercise heart rate, ventilation, and ratings of perceived exertion were higher during the luteal phase in hot, humid conditions. No significant differences were found in heat loss responses and core temperature at exhaustion over the menstrual cycle. In summary, the menstrual cycle had a limited impact on prolonged exercise performance in temperate conditions, but it significantly affected performance in hot, humid conditions, likely due to the combination of exercise, heat stress, and elevated core temperature during the luteal phase.

Rudolf H. Moos et al., (1969) The present literature review summarizes the findings of a longitudinal study examining the effects of the menstrual cycle on menstrual symptoms, mood states, and sexual arousal in fifteen married, nulliparous women. Results revealed that these variables exhibited cyclic patterns in relation to the menstrual cycle. Moreover, the women displayed consistent degrees of symptomatology from one cycle to another, with greater consistency observed during the intermenstrual phase compared to the menstrual and premenstrual phases. Interestingly, high premenstrual tension women consistently differed from low premenstrual tension women in terms of negative affect throughout the entire menstrual cycle, as well as in other symptoms during different phases. This suggests that consistently high premenstrual tension women may be a crucial group for further endocrinologic investigations. The study provides important insights into the cyclical nature of menstrual symptoms, mood states, and sexual arousal, highlighting the need for future research with larger and more diverse samples to validate these findings and incorporating objective measures to enhance our understanding of the underlying mechanisms involved in menstrual symptomatology and mood changes.

CHAPTER III

Procedure

In this chapter the procedure adopted for the selection of subjects, selection of physiological variables, criterion measure, reliability of data, procedure for administering the test and measurements and statistical technique employed for the analysis of data have been presented.

Selection of Subjects

Total Sixty (n=60) National Level Female Shooters from different disciplines, including Pistol shooters, Rifle shooters and Shotgun shooters of age group 15 -25 years will be selected by method of purposive sampling. All subject should have participated once in National level Competition in their respective discipline. The selected subjects undergo with the consent form during data collection and further the purpose of this study will be explained to the athletes.

Statistical Techniques

SPSS 26.0 Software will use to analysis the result for study. Mean, standard deviation, standard error we will use. To find out whether there is difference in the selected psychophysiological components at different phases of mensural cycle in national level female shooters. Dependent sample t-test will be used to compare both the groups. The level of significance will set at 0.05.

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